

Remote Transmission at High Speed

NASA's need for a more accurate way to collect data from propulsion tests provided Omni Technologies, of New Orleans, Louisiana, an opportunity to codevelop and market the solution. The FOTR-125, a redundant fiber-optic transceiver for the remote transfer of high-speed digital data, is benefiting NASA while also making a commercial impact.

Stennis Space Center, NASA's field center for rocket propulsion testing, has always faced the dilemma of collecting accurate data from the inherent hostile environment of rocket engine tests. Two options were available for data collection: transmit the analog signals from a test stand to a safe location over long copper cables, risking the signals becoming corrupt through the pickup of electromagnetic noise from the environment; or tape record the analog signal on the test stand and transport the tapes to a safe location for processing—a process that would require extra time to digitize the data. The ideal solution was to digitize the analog signal on the test stand and then immediately transmit this digital data for recording in a safe location. To arrive at this solution, various technological and bandwidth constraints had to be overcome.

Omni and NASA Test Operations at Stennis entered a Dual-Use Agreement to develop the FOTR-125, a 125 megabit-per-second fiber-optic transceiver that allows accurate digital recordings over a great distance. The transceiver's fiber-optic link can be as long as 25 kilometers. This makes it much longer than the standard coaxial link, which can be no longer than 50 meters. According to Joey Kirkpatrick, a NASA engineer and codeveloper of the device, "Stennis needed a method to extend this transmission distance, and converting the existing copper communications interface to fiber optic was the obvious solution." The FOTR-125 utilizes laser diode transmitter modules and integrated receivers for the optical interface. Two transmitters and two receivers are employed at each end of the link with automatic or manual switchover to maximize the reliability of the communications link.

NASA uses the transceiver in Stennis' High-Speed Data Acquisition System (HSDAS). The HSDAS consists of several identical systems installed on the Center's test stands to process all high-speed data related to its propulsion test programs. These transceivers allow the recorder and HSDAS controls to be located in the Test Control Center in a remote location while the digitizer is located on the test stand. Using

the transceivers in the HSDAS provides a more reliable, capable, and flexible high-frequency data system than previously achievable.

Several versions of the FOTR-125 have been developed allowing additional flexibility. Both redundant and nonredundant versions are available, and the unit may be packaged either as a stand-alone unit or as a rack-mountable chassis unit supporting up to 10 transceivers offering multiple channel capability. The rack-mount chassis also provides for a direct-current battery power supply as a back-up power source. In addition, a daughter card mounting on the FOTR-125 printed-circuit board has been developed, which provides direct access to the Transparent Asynchronous Transceiver Interface (TAXI)-encoded data stream. The FOTR TAXI interface is designed to work with Integrated System Consultants' Direct to Disk system or can be monitored directly with a differential parallel interface.

The Technology Transfer Office at Stennis granted Omni an exclusive license to commercialize the FOTR-125. It is normally packaged as a stand-alone transceiver with built-in power supplies, although other form factors can be accommodated. Omni markets the device to facilities that perform extremely hazardous testing, such as explosives, ordnance, nuclear, rocket engines, and some combustion turbine engines. For government applications, the use of the transceivers at Stennis will continue to grow as incremental upgrades to the HSDAS take place.



Omni Technologies' FOTR-125 is a redundant fiber-optic transceiver that remotely transfers high-speed digital data.